Evaluation of novel &bgr;-ribosidase substrates for the differentiation of Gram-negative bacteria

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Abstract

To synthesize novel substrates for the detection of &bgr;-ribosidase and assess their potential for the differentiation of Gram-negative bacteria.

Two novel chromogenic substrates, 3',4'-dihydroxyflavone-4'-&bgr;-D-ribofuranoside (DHF-riboside) and 5-bromo-4-chloro-3-indolyl-&bgr;-D-ribofuranoside (X-riboside) were evaluated along with a known fluorogenic substrate, 4-methylumbelliferyl-&bgr;-D-ribofuranoside (4MU-riboside). A total of 543 Gram-negative bacilli were cultured on media containing either DHF-riboside or X-riboside. Hydrolysis of DHF-riboside or X-riboside resulted in the formation of clearly distinguishable black or blue-green colonies, respectively. Hydrolysis of 4MU-riboside was evaluated in a liquid medium in microtiter trays and yielded blue fluorescence on hydrolysis which was measured using fluorimetry. &bgr;-Ribosidase activity was widespread with 75% of strains, including 85·6% of Enterobacteriaceae, showing activity with at least one substrate. Genera that demonstrated &bgr;-ribosidase activity included *Aeromonas*, *Citrobacter*, *Enterobacter*, *Escherichia*, *Hafnia*, *Klebsiella*, *Morganella*, *Providencia*, *Pseudomonas*, *Salmonella* and *Shigella*. In contrast, strains of *Proteus* spp., *Acinetobacter* spp., *Yersinia enterocolitica*, *Vibrio cholerae* and *Vibrio parahaemolyticus* generally failed to demonstrate &bgr;-ribosidase activity.

The novel substrates DHF-riboside and X-riboside are effective for the detection of &bgr;-ribosidase in agar-based media and may be useful for the differentiation and identification of Gram-negative bacteria.

This is the first report describing the application and utility of chromogenic substrates for &bgr;-ribosidase. These substrates could be applied in chromogenic media for differentiation of Gram-negative bacteria.